

## Claims

- [c1] 1.A interconnect plate comprising a fuel intake manifold, a fuel exhaust manifold, an oxidant intake manifold, and an oxidant exhaust manifold, said interconnect plate comprising a lamination of three layers, wherein:
- (a)a first layer comprises a fuel plate defining a fuel flow field;
  - (b)a second layer comprises an oxidant gas plate defining a oxidant gas field; and
  - (c) a third layer comprises an barrier plate disposed between the fuel plate and the oxidant gas plate, said barrier plate comprising a central barrier portion separating the fuel flow field and the oxidant gas field and defining
    - i.a fuel intake opening providing fluid communication between the fuel intake manifold and the fuel flow field,
    - ii.a fuel exhaust opening providing fluid communication between the fuel flow field and the fuel exhaust manifold,
    - iii.an oxidant gas intake opening providing fluid communication between the oxidant intake manifold and the oxidant gas field,
    - iv.an oxidant gas exhaust opening providing fluid communication between the oxidant gas field and the oxidant exhaust manifold;
  - (d) and wherein the fuel flow field, oxidant gas field and central barrier portion are centrally positioned in the interconnect and the fuel intake manifold, fuel exhaust manifold, oxidant intake manifold and oxidant exhaust manifold are peripherally positioned in the interconnect.
- [c2] 1.The interconnect plate of claim 1 where the oxidant gas plate defines a plurality of elongated linear oxidant flow fields.
- [c3] 2.The interconnect plate of claim 1 where the plates are comprised of a metal.
- [c4] 3.The interconnect plate of claim 4 wherein the metal is a stainless steel.
- [c5] 4.The interconnect plate of claim 1 wherein the fuel side plate, oxidant gas side plate and barrier plate are brazed together.
- [c6] 5.The interconnect plate of claim 1 where the fuel side plate, oxidant gas side plate and barrier plate are welded together.
- [c7] 6.The interconnect plate of claim 1 where the fuel side elements of the

interconnect plate are nickel plated.

[c8] 7.The interconnect plate of claim 8, where the plating is about 5 to about 10  $\mu$  m thick.

[c9] 8.The interconnect plate of claim 1 wherein interconnect plate is substantially square or rectangular in shape and wherein the fuel intake and exhaust manifolds are arrayed on opposing sides of the square or rectangle and wherein the oxidant gas intake and exhaust manifolds are arrayed on opposing sides of the square or rectangle.

[c10] 9.A solid oxide fuel cell stack comprising at least two interconnect plates as claimed in claim 1, a solid oxide fuel cell unit, a manifold seal continuously encircling each manifold, and a cell seal continuously encircling the fuel cell unit, wherein the fuel cell unit, manifold seals and cell seal are disposed between the two interconnect plates.

[c11] 10.A planar interconnect plate having two major surfaces and four minor surfaces, and defining a fuel intake manifold, a fuel exhaust manifold, an oxidant intake manifold, and an oxidant exhaust manifold, wherein the four minor surfaces are each within a manifold, said interconnect plate comprising:

- (a)a fuel side surface having a first continuous sealing surface and defining an open fuel flow field isolated by the first sealing surface;
- (b)an oxidant side having a second continuous sealing surface and defining an open oxidant flow field isolated by the second sealing surface;
- (c)a first port defined by a first minor surface and within the interconnect between the first and second sealing surfaces, which provides fluid communication between the fuel intake manifold and the fuel flow field;
- (d)a second port defined by a second minor surface and within the interconnect between the first and second sealing surfaces, which provides fluid communication between the fuel flow field and the fuel exhaust manifold;
- (e)a third port defined by a third minor surface and within the interconnect between the first and second sealing surfaces which provides fluid communication between the oxidant intake manifold and the oxidant flow field;
- (f)a fourth port defined by a fourth major surface and within the interconnect

between the first and second sealing surfaces which provides fluid communication between the oxidant flow field and the oxidant exhaust manifold;  
and wherein the fuel flow path comprising the first and second ports and the fuel flow field does not join the oxidant flow path comprising the third and fourth ports and the oxidant flow field.

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